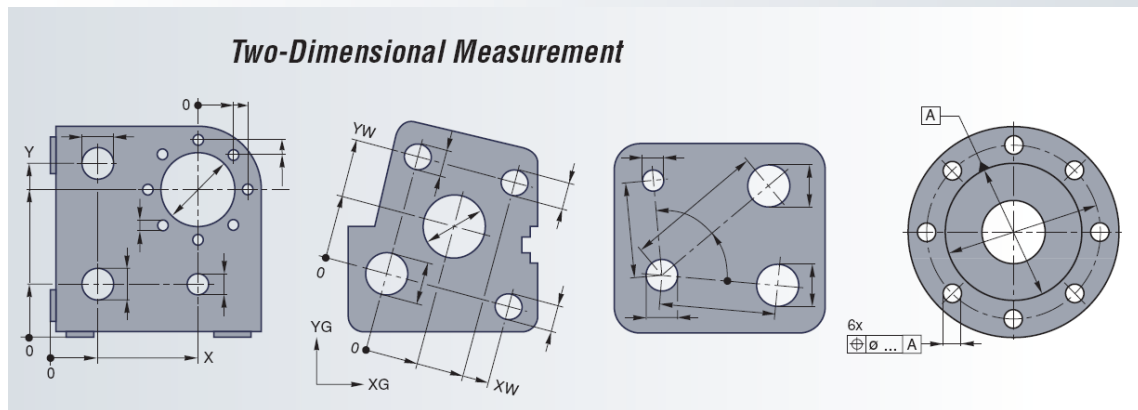
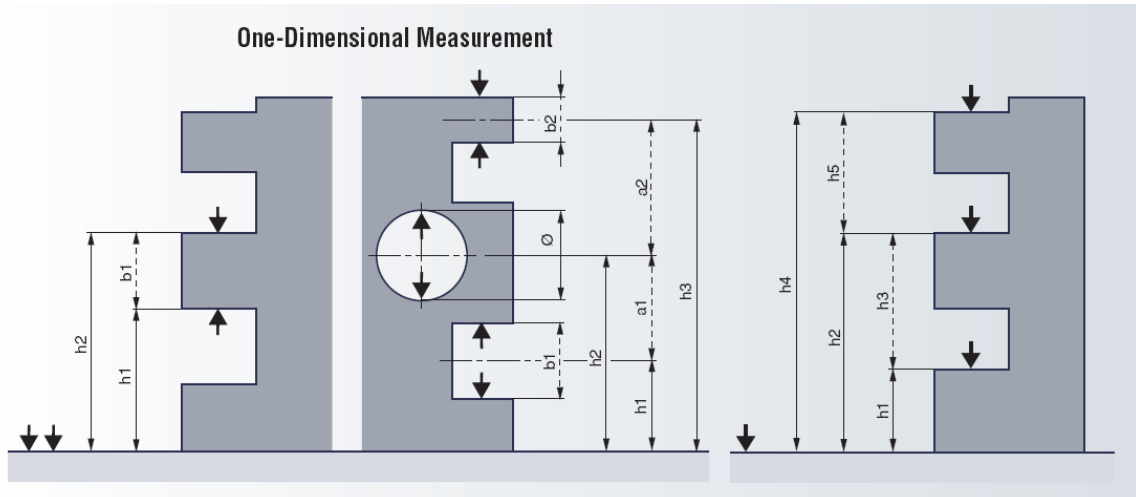


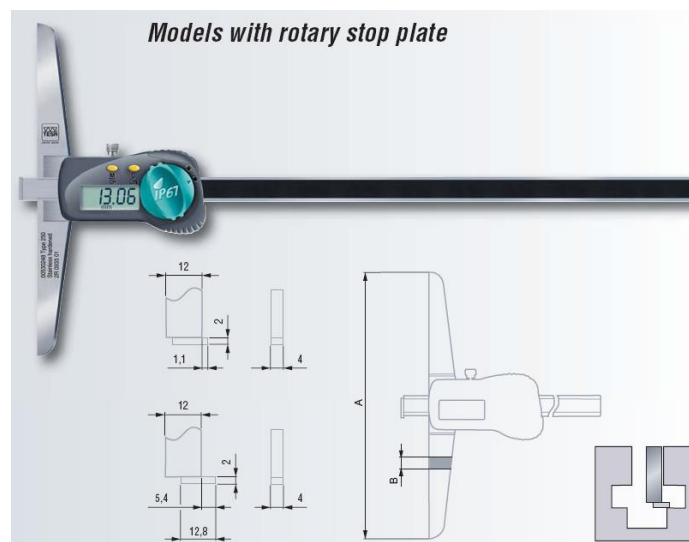
تکلیف سری دوم اصول مهندسی نصب

۱- حداقل دو روش برای تراز نمودن یک میز تنیس بیان نمایید.

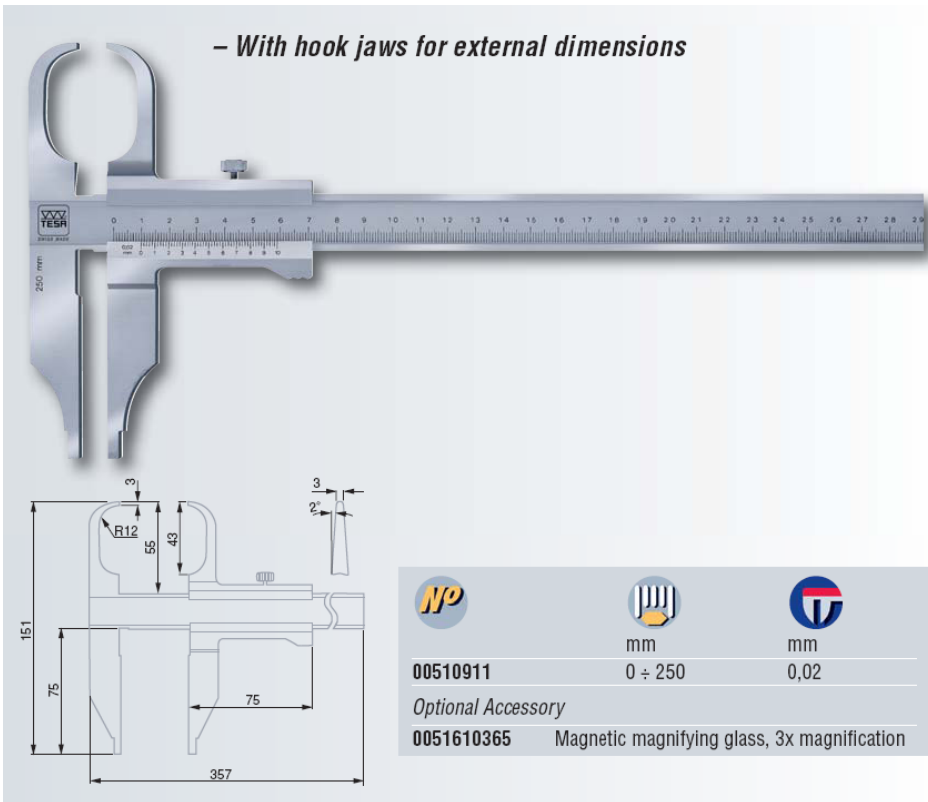
۲- روش اندازه گیری ابعاد زیر را با دقت 0.01 میلیمتر شرح دهید.



۳- موارد استفاده و چگونگی استفاده از وسایل اندازه گیری زیر را بیان کنید.



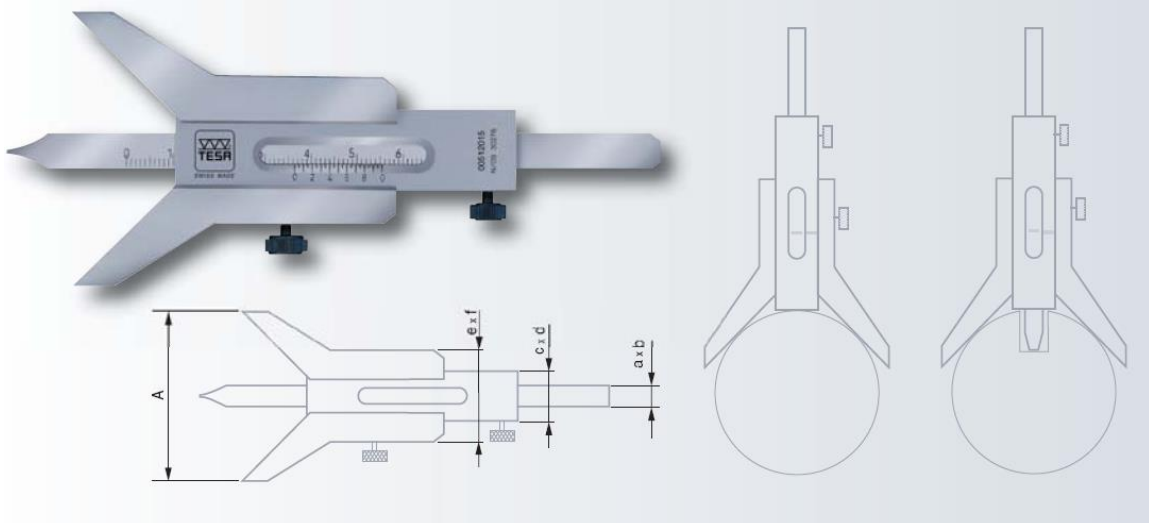
– With hook jaws for external dimensions



•

TESA Calipers with Vee Bridge

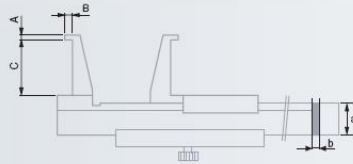
Made to measure groove and slot depths on cylindrical shafts.



•

TESA Calipers for Turned Grooves

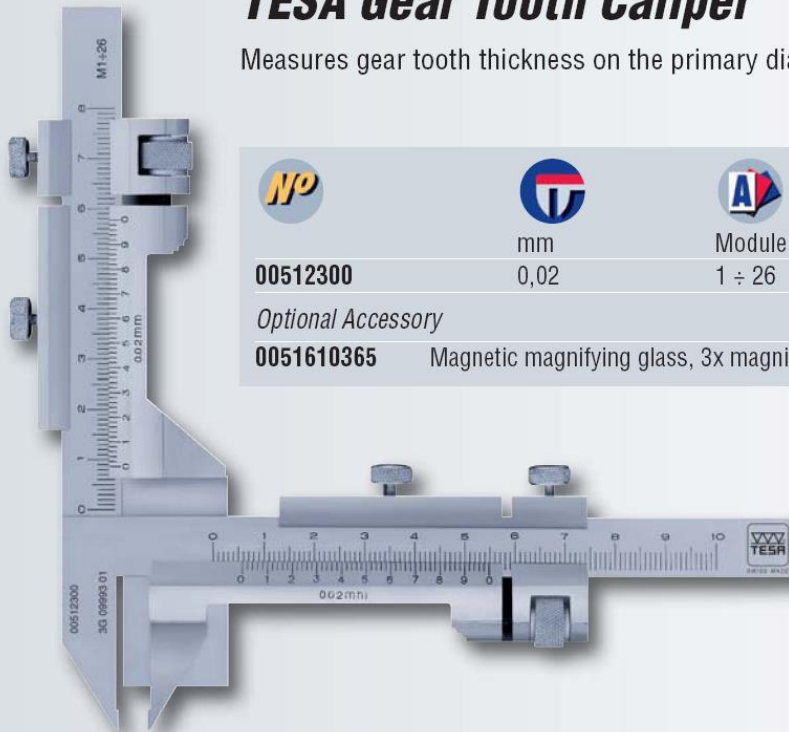
Specially designed for measuring groove or slot diameters, e.g. on safety rings.



ت

TESA Gear Tooth Caliper

Measures gear tooth thickness on the primary diameter.



mm

Module

00512300

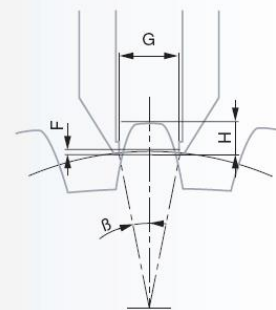
0,02

1 ÷ 26

Optional Accessory

0051610365

Magnetic magnifying glass, 3x magnification



ت

ETALON 260 **Standard Models with Analogue Indication**

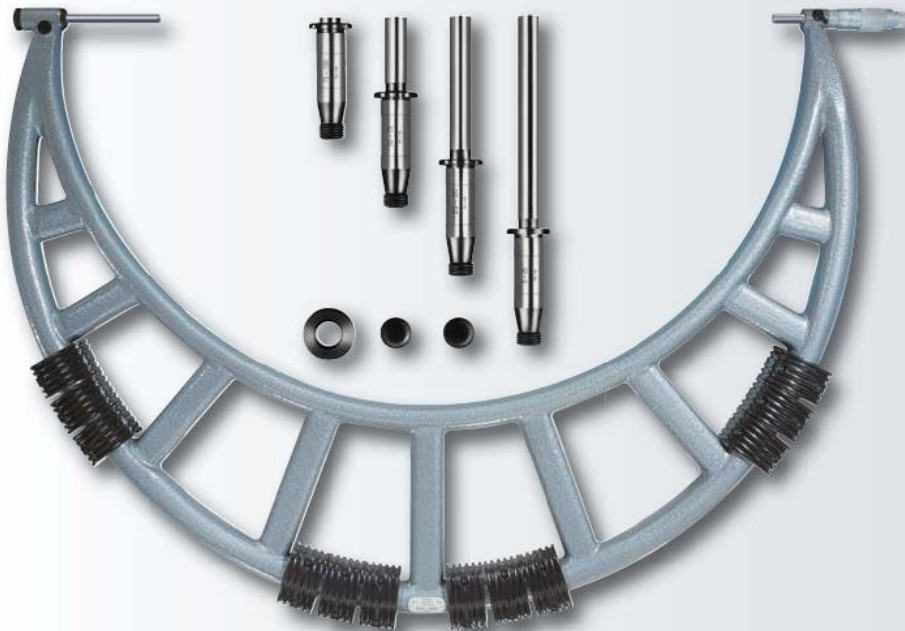
The knurled sleeve only needs to be reversed to render the friction drive built into the thimble inactive.



☉

ISOMASTER AB **with interchangeable Anvils**

Lightweight, but rugged anvil micrometers. Set No. 00140101 includes 4 interchangeable anvils with increasing length in steps of 25 mm. Anvils are adjusted (and numbered) in pairs, thus rendering any correction of the indication unnecessary whenever an anvil is exchanged.



☉

MICRO-ETALON 225 **Micrometers with a Dial Indicator**

Feature a mobile anvil along with a built-in dial indicator – Ideal for comparative measurements on small part series – Nominal dimension is set on the micrometer while deviations are read on the dial indicator – Retractable anvil by means of a push-button – Rotating dial for fine adjustment, also with adjustable tolerance markers.



ε




ε

Micrometers with One Spherical Measuring Face

Measure wall thickness of tubing.

Models MICROMASTER

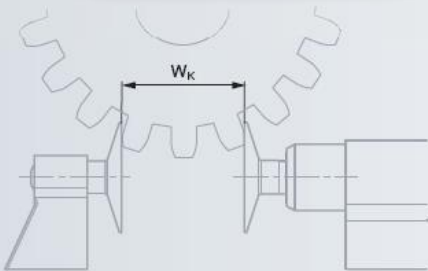



No		
	mm	in
06030079	0 ÷ 30	0 ÷ 1.2
06030080	25 ÷ 50	1 ÷ 2

3

Models MICROMASTER

Non-rotating measuring spindle – Without spindle lock.



No		
	mm	in
06030041	0 ÷ 30	0 ÷ 1.2
06030042	25 ÷ 55	1 ÷ 2.1
06030043	55 ÷ 85	2.1 ÷ 3.35
06030044	85 ÷ 115	3.35 ÷ 4.5

3

ETALON Basic for Tube Wall Thickness Measurement

Barrel-shaped anvil for measuring the tube wall thickness and other curved workpieces.



د

Micrometers with Prismatic Measuring Faces

Measure test pieces with uneven number of grooves such as milling cutters, taps, drills and spline shafts as well as odd polygons. Determine roundness errors on cylindrical surfaces. Angle of the prism aperture is designed for workpieces having a number of 3 or 5 flutes.

 **Models MICROMASTER**



د

Micrometers for Thread Measurement

Used for pitch diameter inspection – Anvil with adjustable holder for mounting a measuring insert with prismatic faces – Fine screw adjustment and locking device – Spindle has a fixing bore for a cone-shaped measuring insert.

Models MICROMASTER AC



ث

Micrometer Heads

Components commonly used for checking the various displacements on measuring fixtures, coordinate tables, microscopes, machines as well as other special appliances. Mounted on the cylindrical coupling shaft.

Models MICROMASTER

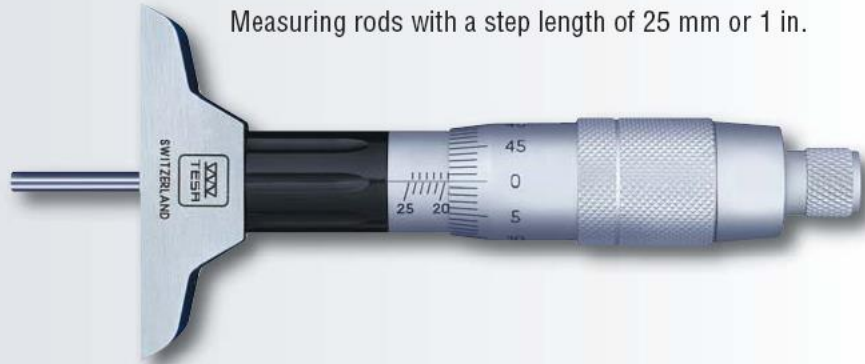
Without spindle lock.



س

Models ISOMASTER AQ

Measuring rods with a step length of 25 mm or 1 in.



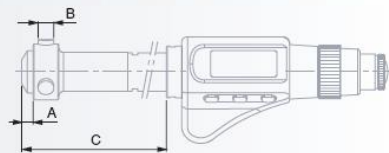
No.	mm	mm
00211002	0 ÷ 75	50 x 15
00211003	0 ÷ 150	50 x 15
00211004	0 ÷ 75	100 x 15
00211005	0 ÷ 150	100 x 15

ش

TESA IMICRO capa μ system with Digital Display



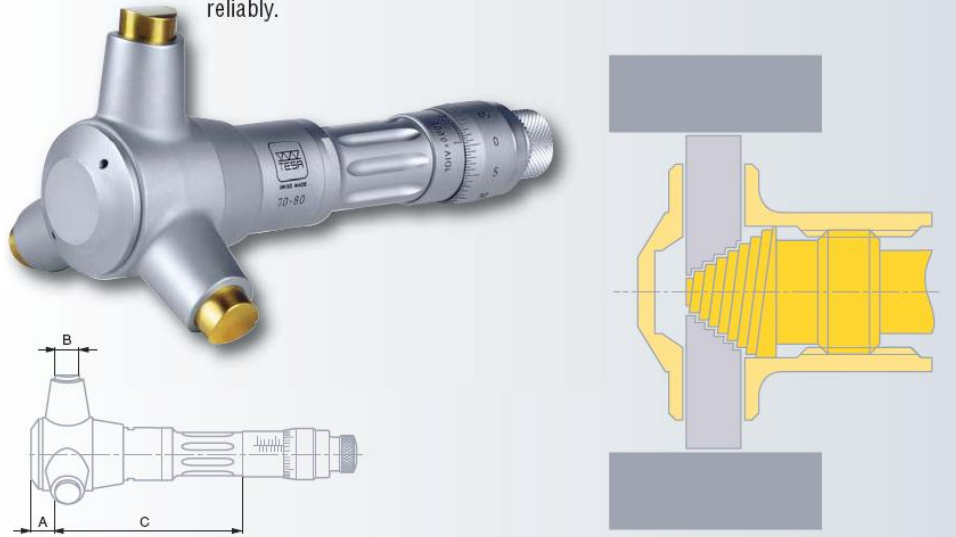
A successful combination of the patented TESA capacitive system with the IMICRO unique cone.



ص

TESA IMICRO with Analogue Indication – Metric

Self-centring and self-aligning internal micrometers. The high-precision thread machined into the measuring cone, combined with the measuring bolts specially arranged to provide 3-line contact, make them the only micrometers in the world that respect the ABBE principle. Measure depth, reliably.



ض

Accessories for both TESA IMICRO and TESA IMICRO capa μ system

Extensions for Deep Hole Measurement



DIN 863 T4
(Style C1)

					
	mm	mm		mm	mm
00840001	6 ÷ 12	100	00841800	40 ÷ 100	150
00840301	11 ÷ 20	150	00841801		500
00840302		500	00841802		1000
00841100	20 ÷ 40	150	00842600	100 ÷ 300	150
00841101		500	00842601		500
00841102		1000	00842602		1000

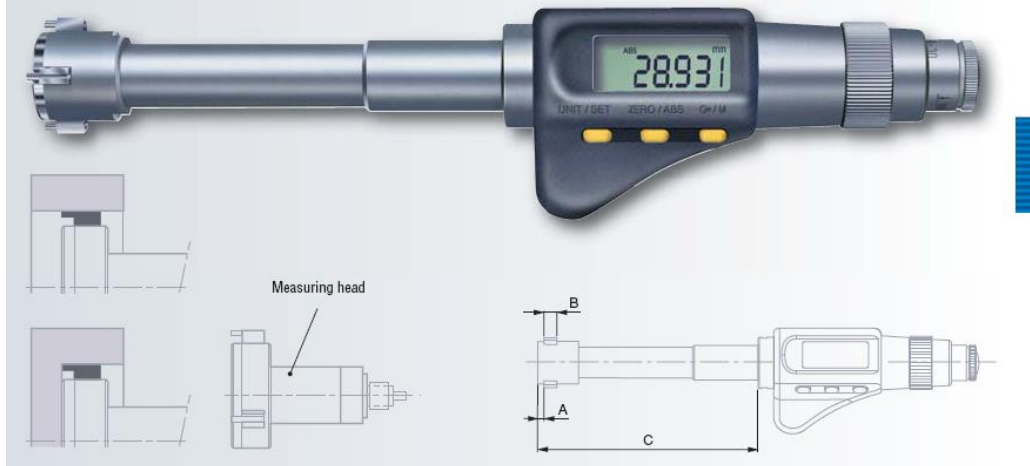
ط

TESA ALESOMETER *capa μ system* with *Digital Display*



Fitted with a TESA patented capacitive measuring system

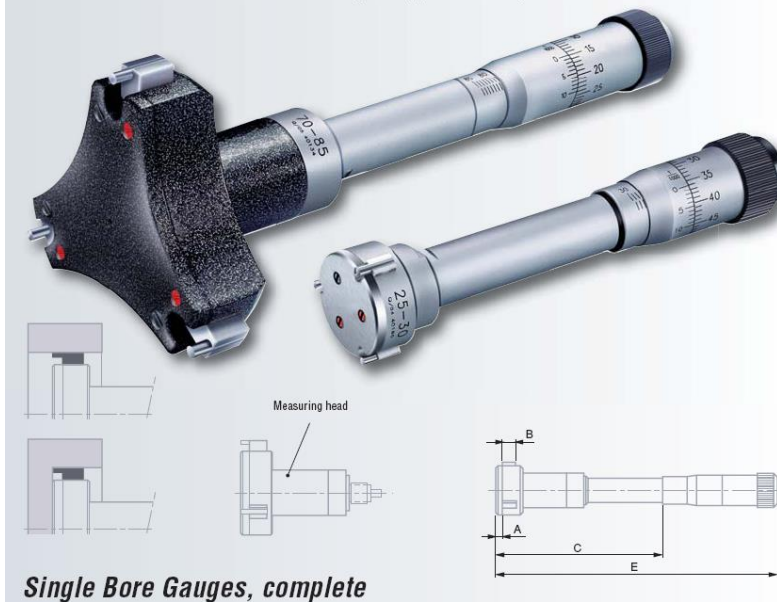
Bore gauges with 3-line contact. All TESA ALESOMETER are made to measure through and blind bores as well as short centring shoulders, except for the models covering the application range from 6 to 10 mm.



ط

ROCH ALESOMETER with *Analogue Indication, Metric*

Bore gauges with 3-line contact. All ROCH ALESOMETER let you measure not only through bores, but also blind bores as well as centring shoulders, except for the models covering the application range 6 to 10 mm.



Single Bore Gauges, complete

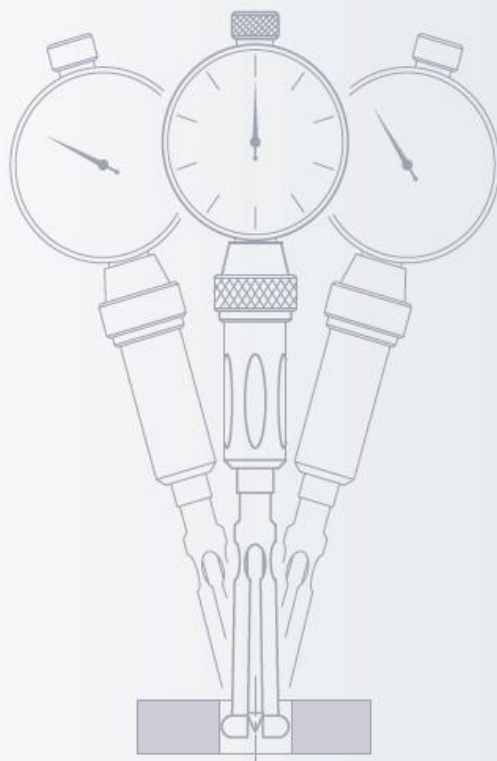
ε

TESA YA Bore Gauges

Specially designed for small bores from 0,47 up to 12,20 mm – Check bore sizes as well as form and shape errors through 2-point measurements – Excellent repeatability.

These bore gauges have an interchangeable measuring head housing a needle as well as a clamping shank with a 8 mm diameter fixing bore for a dial gauge or any other sensor.

- Probing heads with spherical faces for through bores.
- Probing heads with faces forming a rounded edge on their front face. Used to check blind bores or short centring shoulder.
- Probing heads for deeper bores.



Optional Accessories for TESA YA Bore Gauges

Measuring stand for stationary use.



01639009

INTERAPID UA 30 measuring stand

Must be equipped with:

01610201

UK 25 sliding arm

01640000

UAZ 10 depth stop



INTERAPID Thickness Gauges

These gauges with a frame are specially made to measure the thickness of plastic parts as well as hard and soft materials such as glass, wood, paper, rubber, metal sheets etc. – All models have a dial that can be rotated for zero setting.



Small-size models, reading to 0,1 mm

With open inserts when not in use

				
	mm	mm	mm	mm
074115586	0 ÷ 10	0,1	flat	Ø 6,35
074115587	0 ÷ 10	0,1	flat	Ø 10

ق

				
		mm	Width mm	Mount mm
01639047	V-base	10 ÷ 100	120° 16	Ø 8

ك

INTERAPID Small Bench SHE.30 or SHE.35

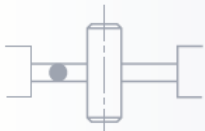
The ideal solution for precise inspection of small part series dedicated to watchmaking and precision mechanics – Fast in measuring and easily adaptable to changes from a workpiece-type to another – Wide choice of measuring inserts specially designed for the broadest variety of metrology applications.



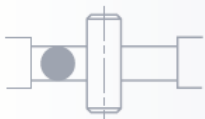
INTERAPID SHE.30
for External Dimensions



03360300



03360301



03360302



03360307

No



03330004 INTERAPID small measuring bench SHE.30 for external dimensions, without measuring inserts

Tungsten carbide tipped measuring inserts available in pairs

03360300 Flat measuring face, 3,5 mm long, 0,4 mm thick

03360301 Cylindrical insert with a flat measuring face, 1,2 mm diameter

03360302 Cylindrical insert with a flat measuring face, 2 mm diameter

03360307 Knife-edged measuring face, 3,5 mm long, 0,05 mm thick, 40°

Inserts with special design available upon request.



B 124



B 132



B 125



B 121



B 134



B 133



B 152



B 151



U

ROCH Radius Gauges

Radius gauges with both concave and convex blades – Designed for visual assessment of radii.

	 Number of blades	 Radii mm	Stepping mm	 Radii mm
0951753001	2 x 17	1,0 ÷ 2,75 3,0 ÷ 7,0	0,25 0,5	0,1 0,1
0951753002	2 x 16	7,5 ÷ 15,0	0,5	0,15
0951753003	2 x 15	15,5 ÷ 19,5 20,0 ÷ 25,0	0,5 1,0	0,2 0,2



V

TESA Angle Protractor with Numerical Indication

- Decimal or sexagesimal large LC display
- 2 measuring directions
- Fine setting
- Locking device
- Scales - 200 300 or 500 mm



ن

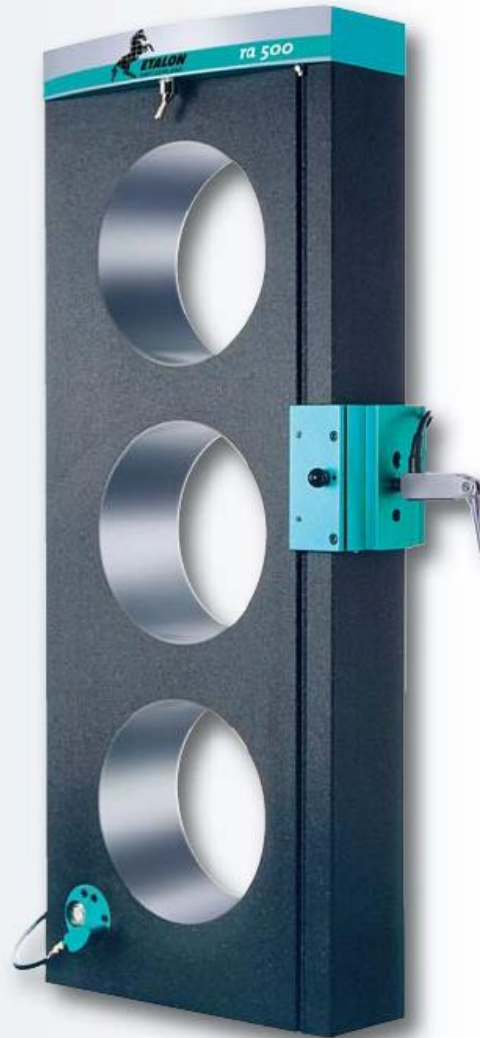
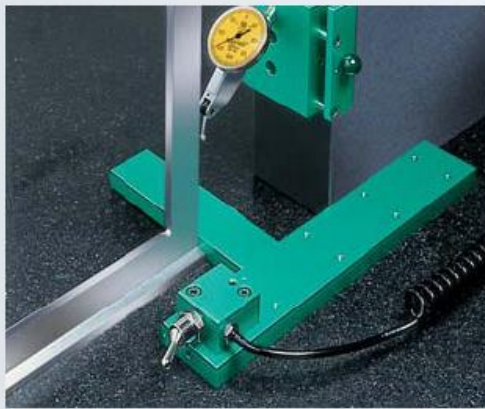


و

ETALON RA for Squareness Measurement

High-precision measuring instruments for determining squareness, straightness and parallelism errors – Perfect for use in the inspection laboratory as on the shop floor.

- Angle and straightness standards are made of natural granite with finely lapped measuring faces.
- Patented, hand moved carriage that attaches by vacuum on the guiding face of the angular standard. The grid potential thus obtained enables the carriage to be guided free of play.
- Base face on air bearing for easy displacement of the reference angle on the surface plate, practically without wear and tear.
- Helpful optional accessories to make measuring easy.



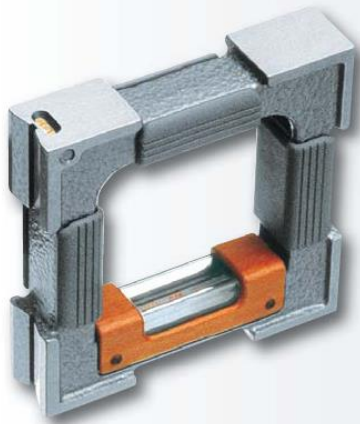
TESA Screw-On Spirit Levels







٤

TESA Precision Spirit Levels with a Frame

For checking and levelling flat or cylindrical surfaces in both horizontal and vertical positions – Insulating grips and vial protection – Side viewing slots.



	 mm/m	 mm	 For shafts mm
05331201	0,05	100 x 100 x 32	17 ÷ 84
05331202	0,1	100 x 100 x 32	17 ÷ 84
05331204	0,05	150 x 150 x 35	17 ÷ 94
05331206	0,02	200 x 200 x 40	19 ÷ 108
05331208	0,05	200 x 200 x 40	19 ÷ 108
05331210	0,05	250 x 250 x 45	19 ÷ 120

٥

TESA Protractor Spirit Inclinerometers

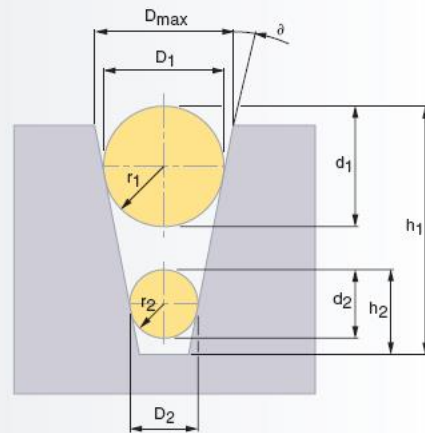


ا پ

Steel Balls

Steel balls are used to measure internal tapers and the like.

TESA Steel Balls



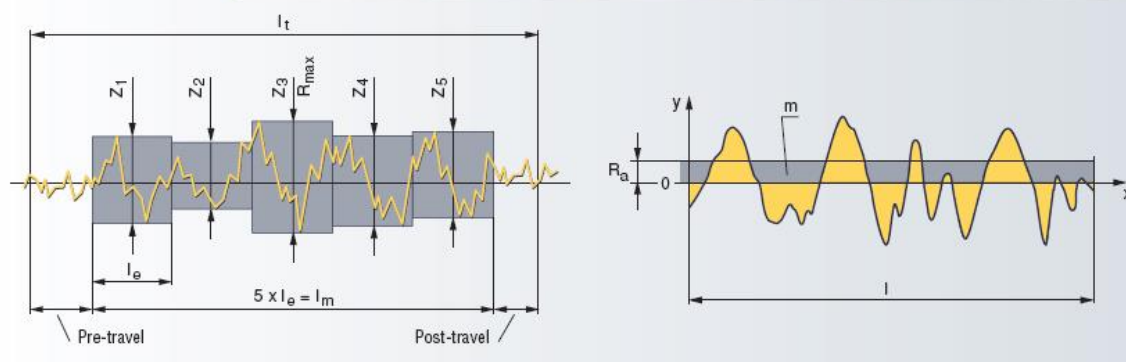
ا ت

Type TTCH

Tungsten carbide plug gauges, type GO/NO GO (2 items)



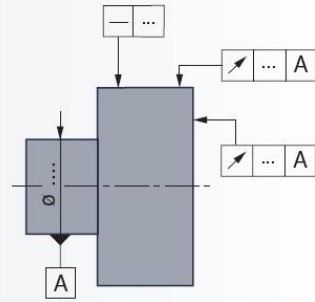
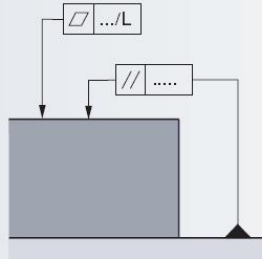
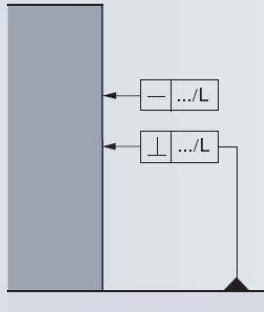
ا ث



ج ا



Programme functions for the detection of form and position errors

with use of a TESA IG-13 digital probe



TESA IG-13

Technical data

	06930012
	RUGOSURF 90 G
Display	Tactile TFT colour display, size 3,5" Resolution 320 x 240 pixels, 256 colours
Roughness parameters	according to ISO 4287:1997/JIS B0601:2001/ASME B46-2002 Ra - Rq - Rt - Rz - Rp - Rv - Rc - RSm - R5c Pa - Pq - Pt - Pp - Pv - Pc - PSm - P5c Wa - Wq - Wt - Wz - Wp - Wv - Wc - WSm - W5c according to ISO 13565 Rk - Rpk - Rvk - Mr1 - Mr2 according to PrEN 10049 PPc - RPc - WPc according to DIN 4776 Rmax according to DB N31007 R3z - R3zm according to ISO 12085 (CNOMO) Pt - R - AR - Rx - Wte - AW - Wx - Rka - Rpk - Rvk - W - Mrle - Mr2e
Measuring span	
X-axis	50 mm
Z-axis	1000 µm
System of units	mm / in
Resolution	0,001 µm (0.01 µin)
Cut-offs	0,08 - 0,25 - 0,8 - 2,5 - 8 mm
Numerical filter	Type Gaussian as per ISO 11562
Traversing length l _t	(number of cut-offs + 1) x λ _c
Cut-off l _t	number of cut-offs x λ _c
Probing speed	0,5 mm/s - 1 mm/s
Number of selectable cut-offs	1 up to 19 cut-offs of 0,08; 0,25; 0,8; 2,5 mm 1 up to 5 cut-offs of 8 mm
Keypad	Three-key, membrane-type keypad protected against dust particles and liquids
Probing system	inductive probe
Probe tip	90° diamond tip
Tip radius	5 µm
Measuring force	0,75 mN (ISO 3274)
Available languages	English, French, German, Spanish, Italian, Portuguese
Memory capacity	≈ 60 000 measurements
Autonomy	≈ 2 000 measurements / ≈ 10 hours
Power supply	12V integrated Battery pack - Battery charger 100 to 240 Vac, 50/60 Hz
Power consumption	max. 20 VA at 220 V
Overall dimensions	270 x 140 x 90 mm (gauge unit alone)
Weight	3 kg





ا

TESA-HITE plus M 400 / 700

Precision in Motion – Motorised Version

The added value of the motorised TESA-HITE plus M 400 / 700 is not only noticeable in their technical features, but also in their ease of use. Combine with the programming function, this solution is ideal for recurrent measurements in the shop floor environment. Advanced functions allow for complex calculations such as those required for two-axis or perpendicularity measurement. These height gauges with outstanding features offer the most attractive price/performance relationship, making them indispensable for the workshop.



- Wide application range.
- Electronics entirely protected from the penetration of liquids and dust particles.
- Integrated air cushion, mounted control panel.
- Easy, intuitive use of the rotary power control.
- Provide all the measuring functions of a dedicated motorised column, including height, diameter, distance, parallelism, perpendicularity, straightness, angle and 2D measurement besides programming, automatic probing cycles, statistical value processing.
- TESA's patented measuring system, opto-electronic.
- Probe insert holder and inserts compatible with those of TESA MICRO-HITE.
- SCS calibration certificate attached to each height gauge.

TESA- μ HITE

Extended application range up to 360 mm





072103522

Ball tip
5 mm



mm

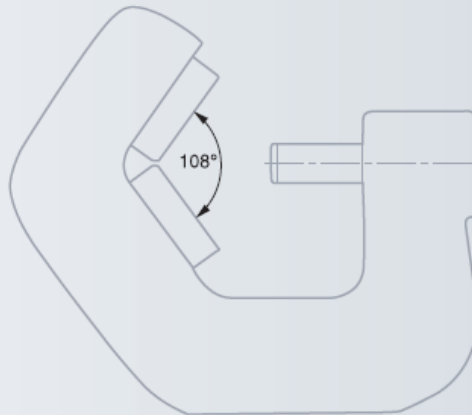
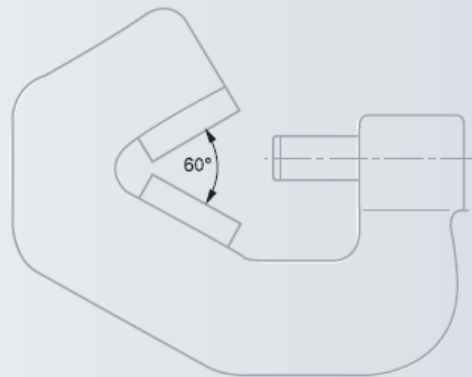
in

3-flute test pieces (60°)

06030087	1 ÷ 7	0.04 ÷ 0.27
06030088	5 ÷ 20	0.20 ÷ 0.80
06030089	20 ÷ 35	0.80 ÷ 1.38
06030090	35 ÷ 50	1.38 ÷ 1.97
06030091	50 ÷ 65	1.97 ÷ 2.56
06030092	65 ÷ 80	2.56 ÷ 3.15

5-flute test pieces (108°)

06030093	1 ÷ 7	0.04 ÷ 0.27
06030094	5 ÷ 25	0.20 ÷ 0.98
06030095	25 ÷ 45	0.98 ÷ 1.77
06030096	45 ÷ 65	1.77 ÷ 2.56
06030097	65 ÷ 85	2.56 ÷ 3.35



Models ISOMASTER AS



No



mm

3-flute test pieces (60°)

00410001 1 ÷ 7

00410002 5 ÷ 20

00410003 20 ÷ 35

00410004 35 ÷ 50

00410005 50 ÷ 65

5-flute test pieces (108°)

00410102 5 ÷ 25